3.0 Affected Environment

3.1 Introduction

The Sunset Bay property is located about 4 miles west of the Sharps Chapel Community and locally known as the Russell Brothers Farm. It lies along the north side of a peninsula (Big Ridge) and fronts approximately seven miles of Lost Creek embayment; the southwest end of the property is located at Clinch River mile 103R. Since its sale in 1947, TVA has retained flowage easement rights over land below elevation 1044-foot mean sea level (msl) along the reservoir shoreline. On this flowage easement land, approximately 160 acres, TVA can prohibit fills, excavations, and construction of structures. Approximately 14 acres, located in 3 areas on the site, are on this flowage easement land subject to the proposed activities. The majority of the property planned for development, approximately 840 acres, is located above elevation 1044-foot msl.

The Russell Brothers Farm is currently used as pasture land, regularly grazed by several hundred head of cattle. Terrain is gentle to rolling nearer the Lost Creek embayment shoreline in the area of the flowage easement land and moderate to steep inland toward the ridge line. Grassland and fence line trees dominate the less steep terrain, while upland hardwood forest dominates the upper slopes toward the crest of Big Ridge.

Norris Reservoir has more than 809 miles of shoreline and 264 miles zoned for residential access (TVA, 2001). There are currently few other ongoing activities that may cumulatively affect resources of concern for the TN Emmons development. Much of the area is rural, with some forestland and agriculture, mostly in the form of pasture. Other residential shoreline developments on Norris Reservoir of a similar or smaller scale include Lone Mountain Shores, Norris Crest, Norris Shores, Tanglewood, Sugar Camp, Lakeland, Lakewood Forest, and Tumbling Run Subdivisions and Woodlake Golf Community. Several private docks or commercial marinas, i.e., Andersonville Boat Dock, Hickory Star Marina and Campground, and Lakeview Marina, as well as Lost Creek Campground exist within about 10 river miles of TN Emmons' planned Sunset Bay development. The Chuck Swan WMA lies along the opposite shore of Lost Creek embayment across from the proposed Sunset Bay development. Big Ridge State Park occupies land on the opposite shore at CRM 103L.

The existing environmental resources that would be directly, indirectly, or cumulatively affected by the proposed federal approvals for the Sunset Bay development are discussed in this chapter. The chapter is organized by potentially affected resources and parallels those discussed in the environmental consequences section (Chapter 4).

3.2 Transportation System

3.2.1 Highways

The Sunset Bay site is located approximately 16 miles east of Interstate Highway 75. Access to the site is via State Route 33, which provides access between Knoxville and Tazewell, Tennessee. The property is accessed from State Route 33 by turning onto Sharps Chapel Road and then Big Valley Road. From SR 33, it's approximately 9 miles to the proposed new subdivision. State Route 33, in the vicinity of the site, is a good quality two lane rural highway with good shoulder and lane width, 55 mph speed limits, passing zones, and truck passing lanes. Sharps Chapel Road and Big Valley Road are two lane roadways with no paved shoulders or passing lanes. Sharps Chapel Road has some curvy alignment and rolling terrain in areas and generally has a speed limit of 45 mph.

There are some residences and various small businesses scattered along it. There are few residences located along Big Valley Road. It is a poorer quality roadway with a speed limit of 35 mph and poor pavement condition; however, the alignment is fairly straight and level. The intersection of State Route 33 and Sharps Chapel Road has dedicated turning lanes in all directions. The latest available ADT count shows approximately 6760 vehicles per day (vpd) on State Highway 33 just south of the intersection with Sharps Chapel Road. There are approximately 1000 vpd on Sharps Chapel Road in the vicinity of the new subdivision (Tennessee Department of Transportation, 1999). Traffic counts are not available for Big Valley Road, although they would indicate less than that of Sharps Chapel Road.

3.2.2 Navigation and Rail Access

Because of Clinch River's shallow water depths and the absence of a navigation lock, Norris Reservoir is not used for commercial navigation. The proposed Sunset Bay development along Lost Creek embayment is about 23 river miles upstream from Norris Dam (at CRM 79.8). The lake bottom at mile 0 on Lost Creek, at the confluence with the Clinch River near the southwestern end of the proposed development, is below elevation 940-foot msl. At mile 3 on Lost Creek, the lake bottom is between elevation 940 feet msl and 980-foot msl. At mile 5, near the northeastern end of the proposed development, the lake bottom is between elevation 980-foot msl and 1020-foot msl.

The Lost Creek embayment now receives use by casual recreation boaters. The portion of the embayment above mile 3 has hazardous rock outcroppings. There are nine boat hazard markers showing the locations of the rock outcroppings between mile 3 and mile 4 on Lost Creek. These nine markers are about 20 percent of the 43 boat hazard markers on Norris Reservoir.

The Lone Mountain Municipal Airport (south of Tazewell) and Campbell County Airport (just east of Jacksboro) are approximately 15 air miles due east and west, respectively, of the Sunset Bay site. The nearest rail access is about 10.5 miles southeast of the property.

3.3 Socioeconomic Conditions

The property is located within Union County, Tennessee, which according to 2000 estimates by the U.S. Census Bureau, has a population of approximately 17,808. Age 65 and over residents make up about 10.8 percent of the population; slightly below the state average of 12.4 percent and the national average of 12.4 percent. The county's population is predominately white (98.5 percent), while the state is 80.2 percent white. Per capita income in the county in 1999 was $15,610, which is 39 percent less than the state average of $25,548 (source: U.S. Bureau of Economic Analysis). The unemployment rate for the county was estimated to be 3.8 percent for 2001, which is just below the unemployment rate for the state, 4.5 percent, and the nation, 4.8 percent (source: Tennessee Department of Labor and Workforce Development).

The development of this property has received support from local government and business leaders. TN Emmons has worked with the county planning commission in the review of development plans for this project. The developer proposes to fund the total project costs, estimated to be about $7.6 million. Proposed to occur in three phases, each phase would involve development of about one-third or 330 acres of the property. Phase I would cost about $3.5 million and Phases II and III would cost about $2.0 million each. At

build-out, over a 5- to 10-year period, Sunset Bay would have 695 three and four bedroom, single-family residences. During the first year, TN Emmons projects lot sales of up to 100. It is expected that 30 or more homes would likely be constructed along with the community dock and clubhouse/deck. Between the 2nd and 4th years, 170 additional homes would likely be built. Between years 5 and 10, it is expected that 495 homes would be constructed. Lots are planned to range from 0.5 to 10 acres; the majority of lots would be less than 1.5 acres. The typical single-family home would range in size from about 3000 to 6500 square feet.

This residential development would be upscale and benefit the local economy and county tax base. It is expected to add $40 million to the county tax base annually in the near term and likely range up to $88 million by 2012. About 25 short-term jobs would be created, mostly related to infrastructure development within the subdivision. In the long term, it is projected that 75 jobs would be created over the development build-out and beyond. These jobs would likely involve home construction and provide goods and services for new residents of the county.

3.4 Recreation

Three state parks, Big Ridge, Cove Lake, and Norris Dam, are located on the Norris Reservoir. These state parks provide for a variety of public recreational opportunities, including camping, renting cabins, swimming, picnicking, hiking, and other activities. There are also two county parks, 12 paved public boat ramps, and TVA's Loyston Point Recreation Area, which all provide public access and facilities (TVA, 2001). The Tennessee Wildlife Resources Agency (TWRA) has 38 public ramps on Norris Reservoir (TVA, 2000a).

The planned Sunset Bay project is located in the Lost Creek embayment, confluent to the Clinch River (main channel) at CRM 102.3. Because of the unfriendly navigation hazards in Lost Creek, particularly from miles 3 through 6, it is assumed that the boaters originating from this development would probably use two distinct areas. These areas include Area A, locally know as the Loyston Sea (i.e., Mill Creek embayment), and Area B, the main channel of the Clinch River from mile 98 upstream to Highway 33 Bridge at mile 120.3. As illustrated in Figure 12, these areas of boating space at summer (full) pool level (elevation 1020-foot msl) total about 9600 acres and represent approximately 4200 surface acres in Area A and 5400 surface acres in Area B.

Several commercial and public recreation areas that provide water access to Areas A and B are identified on Figure 13. In Area A, Andersonville Marina and Loyston Point Public Recreation Area are within 6 and 3 river miles, respectively, of the mouth of Lost Creek. Between CRMs 102.8 and 104 is the eastern end of Big Ridge State Park, which lies just across the reservoir opposite Sunset Bay (mile 103 left bank). The park has a small public boat ramp at its western end in the Loyston Sea area. At the head of Lost Creek embayment is Lost Creek Campground. Chuck Swan WMA lies directly across Lost Creek embayment from the proposed Sunset Bay project site. In addition, there are several scattered shoreline residential areas (small subdivisions) in Areas A and B that provide water access through private docks (e.g., at the head of Mill Creek).

In area B, Hickory Star Marina is about 1.5 river miles from the mouth of Lost Creek. Also providing access to Area B is Lakeview, 33 Bridge, and Cedar Grove Marinas, and TWRA's

Cedar Grove boat ramp. Norris Shores, Tanglewood, Sugar Camp, Lakeland, Lakewood Forest, and Tumbling Run Subdivisions also provide private boating access.

In total, there are approximately 1300 "fishing/runabout" style boats and 390 houseboats at the five marinas in both Areas A and B. There is capacity for approximately 170 boats from the public ramps. Three hundred and seventy-two (372) private docks have also been approved for construction by TVA in Areas A and B.

3.5 Biological Setting

Norris Reservoir is located within the Great Valley of east Tennessee, or geographically what is described as the Appalachian Ridge and Valley physiographic province of east Tennessee (Fenneman, 1938). This physiographic province is characterized by long ridges and intervening valleys that generally run in a southwestern-to-northeastern direction. Norris Reservoir land is within the oak-hickory forestland resource region, as described by the United States Department of Agriculture (USDA), Forest Service, in 1969.

The 24,000-acre Chuck Swan WMA lies just across Lost Creek to the northwest. Big Ridge State Park (3600 acres) lies to the southwest opposite CRM 103. Private residential and agricultural lands lie to the southeast and northeast of the project site.

3.5.1 Terrestrial Ecology

The areas under review by TVA include 14 acres of land associated with an entrance roadway, two peninsulas, a multiple-slip community dock, parking facility and boat launching ramp. An entrance roadway on the eastern end and a borrow area located about 4 miles from the site were also reviewed. The 14 acres are primarily open pastureland, currently grazed by cattle. Small groups and solitary trees ranging in size from 6 to 42 inches (at dbh) are scattered over the area near rock outcrops, in drainages and along fencerows. Narrow buffers of mature trees are found along the shoreline in a few areas. The open pasture has been maintained by cattle grazing and hay harvest over the years. Dominant ground cover plant species include fescue, clovers and broom sedge. Tree species found on the area include sweet gum, southern red oak, sugar maples, yellow poplar, eastern red cedar, persimmon, hackberry, hickories, black walnut, elm, green ash and sycamore. The shoreline has a few scattered willows and button bushes. Fencerows near the water tend to be overgrown with some tree species of various ages; these are the only areas with any brushy undergrowth. The borrow area is a former hay field that has recently been used as a source of fill material and is a mixture of bare ground, grasses, and forbs.

The applicant plans to retain 20.2 acres of "40-foot-wide conservation buffers" on portions of the property to assist with storm water drainage control and erosion prevention (see Figure 3 and reference to Storm Water Pollution Prevention Plan in Chapter 4, Section 4.7.1, Norris Reservoir Water Quality; and item no. 20 in Chapter 5). These linear corridors typically occur in drainages and, are largely covered with trees, shrubs, and brush. They provide habitat for a variety of wildlife that presently use this area, including many of those species listed below. These buffer areas would be maintained by future landowners; would be connected, to the extent practicable, with other areas of retained or planted trees; and would continue to provide habitat and travel corridors for local wildlife populations.

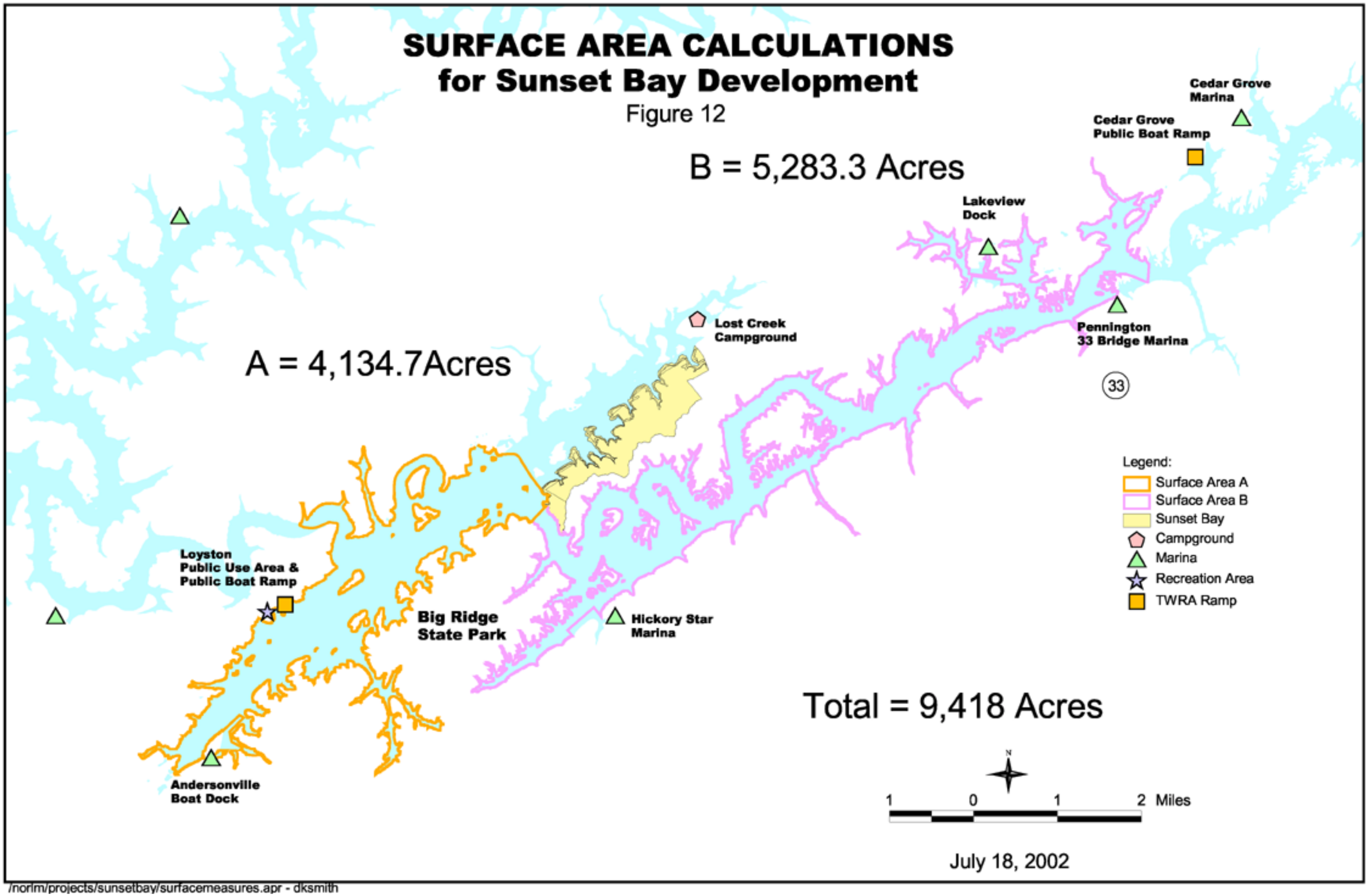

Figure 12. Surface Area Calculations for Sunset Bay Development

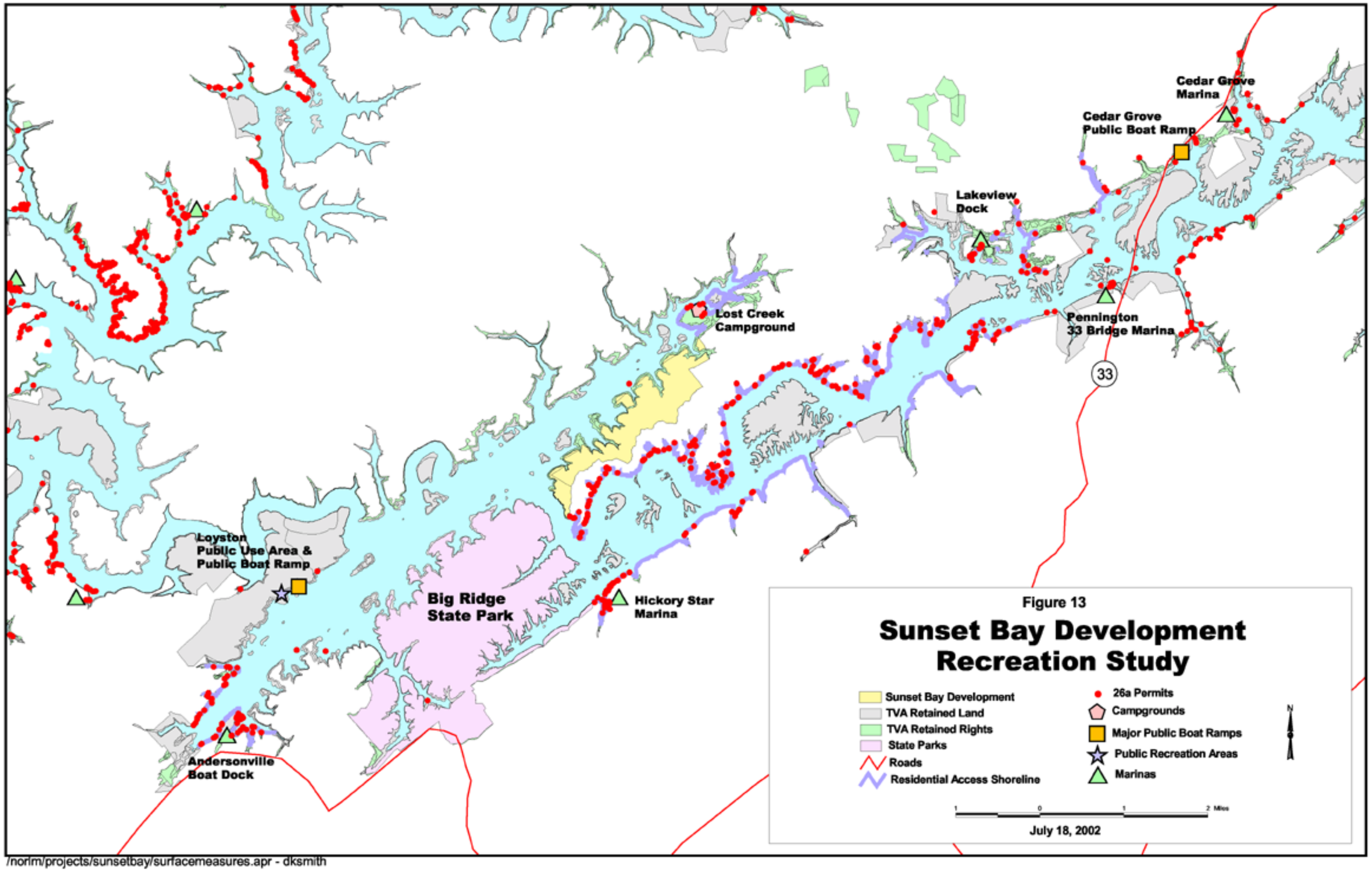

Figure 13. Sunset Bay Development Recreation Study

Wildlife species using the Sunset Bay area include both avian species and terrestrial mammal species. Avian species observed on the property have been common songbird species, American crows, mourning doves, red-tailed hawks, Canada geese, mallards, blue-winged teals, wood ducks, great blue herons, sandpipers, both turkey and black vultures, loons in the water areas fronting the property, and wild turkeys. Three bald eagles (*Haliaeetus leucocephalus*) were observed on two occasions during site visits in April 2002. Terrestrial mammals that should occur include coyotes, red and gray foxes, gray and fox squirrels, raccoons, opossums, and white-tailed deer. Drier, rockier areas above the shoreline could contain northern fence lizards, black rat snakes, and other reptile species.

Threatened and Endangered Species

An assessment of habitat suitability for federal-listed gray bats (*Myotis grisescenis*) and Indiana bats (*Myotis sodalis*) was conducted by BHE Environmental, Inc. (BHE), within a 115-acre portion of the Sunset Bay site. Conduct of the habitat survey was based on March 12, 2002, correspondence between Environmental Systems Corporation (ESC) and an April 3 response from the United States Fish and Wildlife Service (USFWS). The area under review by TVA for the proposed deed modifications and water-use facilities permits is within the area surveyed by BHE. The results of this survey are documented in the May 1, 2002, final report from BHE to Dr. Lee Barclay, USFWS, Cookeville, Tennessee (Appendix A and Chapter 9).

Responding to the May 1 report in a letter dated September 20, 2002, FWS indicated it could support Alternative 2 or 3 as long as its recommendations concerning the Indiana bat and gray bat contained in its May 30, 2002 letter to Amy Henry [BHE Environmental] were incorporated into the project plan. Furthermore, in its May 30 response to BHE's habitat assessment, FWS concurred that the proposed actions would not likely adversely affect the Indiana bat or gray bat as long as implementation measures to restrict time of the year or individual tree removal were adopted. These mitigation measures are included as commitment(s) in the EA (see Chapter 9 and Appendix F).

3.5.2 Aquatic Biology

Aquatic habitat in the littoral (near-shore) zone is greatly influenced by underwater topography and back-lying land use. Underwater topography in upper Norris Reservoir and the Lost Creek embayment varies from moderately steep, with extensive areas of exposed bedrock near the river channel, to typically shallow embayment and cove areas farther from the river and tributary stream channels. Rock is an important constituent of littoral aquatic habitat over much of the area, either in the form of bedrock outcrops, or a mixture of rubble and cobble on steeper shorelines, or gravel along shallower shorelines. Most of the soil exposed in the drawdown zone is clay. Fallen trees and brush provide woody cover, primarily in coves, but also in some other areas. Woody vegetative habitat is greatly reduced on the Sunset Bay site (compared to a forested shoreline) because of past use of back-lying property for pasture and hay production.

With the exception of one perennial stream on the site, water and its attendant aquatic resources on back-lying property are limited to ephemeral drainages. This stream is subject to low flows and, therefore, aquatic life in it is limited. There are no streams on the 14-acre deed modification areas.

In January 1997, TVA conducted a survey on Norris Reservoir to arrive at a shoreline aquatic habitat index (SAHI) score which serves as an indicator to the quality of aquatic habitat conditions in near-shore areas. Shoreline conditions were evaluated by patrolling the shoreline in a boat during winter drawdown and recording observed conditions. The overall average SAHI score at Norris was 13.3 (of a possible 20), which indicates generally "fair" shoreline aquatic habitat within the reservoir. Of the shoreline distance surveyed, 21 percent rated "good"; 74 percent rated "fair"; and 5 percent rated "poor."

Benthic Community – Benthic macroinvertebrate (e.g., lake-bottom-dwelling, readily visible, aquatic worms, snails, crayfish, and mussels) samples were taken in three areas of Norris Reservoir in 1994, 1995, 1997, and 1999, as part of TVA's Reservoir Vital Signs Monitoring Program. Areas sampled included the forebay (area of the reservoir nearest the dam) at CRM 80.4, and mid-reservoir transition stations at CRM 125.0 (the Lost Creek embayment is at approximately CRM 103.0) and Powell River Mile (PRM) 30.0. Bottom-dwellers are included in aquatic monitoring programs because of their importance to the aquatic food chain and because they have limited capability of movement, thereby preventing them from avoiding undesirable conditions. Sampling and data analyses were based on seven parameters (eight parameters prior to 1995) that indicate species diversity, abundance of selected species that are indicative of good (and poor) water quality, total abundance of all species except those indicative of poor water quality, and proportion of samples with no organisms present. Collection methods and rating criteria were different prior to 1994, so those results are not compared directly to samples taken using current methods.

As shown in Table 1, the benthic community in the three areas of Norris Reservoir rated from poor to excellent at various times in comparison to other Ridge and Valley ecoregion reservoirs. The poor rating in 1999 samples from the forebay is largely a result of low density of benthos, which was composed primarily of tolerant oligochaetes. The condition of the forebay benthic community also reflects the low dissolved oxygen levels consistently found there. The benthic community has consistently rated fair or good in the Clinch River arm of the reservoir (Dycus and Baker, 2000).

Table 1. Norris Reservoir Benthic Community Ratings Based on Vital Signs Monitoring Data

Station	Monitoring Years			
	1994	1995	1997	1999
Forebay (CRM 80.4)	Fair	Fair	Good	Poor
Mid-Reservoir Clinch River (CRM 125.0)	Good	Fair	Fair	Fair
Mid-Reservoir Powell River (PRM 30.0)	Excellent	Fair	Good	Excellent

Fish Community – The Reservoir Vital Signs Monitoring Program included annual fish sampling at Norris from 1990 through 1995 and in 1997 and 1999 (no samples were taken

in 1996 or 1998). The electrofishing and gill netting sampling stations correspond to those described for benthic sampling. Fish are included in aquatic monitoring programs because they are important to the aquatic food chain and because they have a long life cycle which allows them to reflect conditions over time. Fish are also important to the public for aesthetic, recreational, and commercial reasons. Monitoring results for each sampling station are analyzed to arrive at Reservoir Fish Assemblage Index ratings, which are based primarily on fish community structure and function. Also considered in the rating is the percentage of the sample represented by omnivores and insectivores, overall number of fish collected, and the occurrence of fish with anomalies, such as diseases, lesions, parasites, and deformities (Dycus and Baker, 2000).

Vital signs fish community monitoring results, comparing Norris Reservoir to other Ridge-and-Valley ecoregion reservoirs, are shown in Table 2. Overall results indicate that the Norris fish assemblage has scored consistently higher at the two mid-reservoir stations than at the forebay. In TVA's most recent fish collections at Norris in the fall of 1999, the fish assemblage rated "excellent" at both mid-reservoir stations due to very good species diversity and composition and very low incidence of anomalies. Similar results were not seen at the forebay, where lower than expected catch rate and species diversity resulted in a lower score. Thirty-one fish species were collected in 1999 (Table 3); although all species were not collected at all sites. Any of them could occur in areas of suitable habitat in the reservoir. More abundant species in the overall sample were gizzard shad, spotfin shiner, bluegill, spotted and largemouth bass, and black crappie (Dycus and Baker, 2000). TWRA 2001 creel data indicate that black bass (i.e., smallmouth, spotted, and largemouth bass), walleye, and striped bass are the species more often sought after by Norris Reservoir sport anglers (TWRA, 2002b).

Table 2. Norris Reservoir Fish Assemblage Index Based on Vital Signs Monitoring Data

	Monitoring Years							
Station	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1997**	**1999**
Forebay (CRM 80.4)	Fair	Fair	Fair	Fair	Good	Poor	Fair	Fair
Mid-Reservoir Clinch River (CRM 125.0)	Good	Fair	Good	Good	Excellent	Fair	Good	Excellent
Mid-Reservoir Powell River (PRM 30.0)	Good	Good	Good	Good	Excellent	Good	Good	Excellent

A Sport Fishing Index (SFI) has been developed to measure sport fishing quality for various species in Tennessee and Cumberland Valley reservoirs (Hickman, 1999). The SFI is based on the results of fish population sampling by TVA and state resource agencies and results of angler success as measured by state resource agencies (i.e., bass tournament results and creel surveys). In 1999, Norris rated better than average for spotted bass and white bass, average for crappie, and below average for black bass species as a group (i.e., largemouth and smallmouth bass), walleye/sauger, striped bass, bluegill, and channel catfish.

Table 3. Fish Species Collected During Norris Reservoir Vital Signs Monitoring, Fall 1999

Species	Forebay (CRM 80.4)	Mid-Reservoir Clinch River (CRM 125.0)	Mid-Reservoir Powell River (PRM 30.0)
Longnose gar	-	X	X
Gizzard shad	X	X	X
Common carp	X	X	X
Spotfin shiner	X	X	X
Quillback carpsucker	-	X	X
Northern Hog Sucker	-	X	X
Silver redhorse	-	X	X
Shorthead redhorse	-	X	X
River redhorse	-	X	X
Black redhorse	-	X	X
Golden redhorse	-	X	X
Channel catfish	X	X	X
Flathead catfish	X	X	X
Brook silverside	X	X	-
White bass	-	-	X
Striped bass	X	X	-
Rock bass	X	X	-
Green sunfish	-	X	-
Warmouth	-	-	X
Bluegill	X	X	X
Redear sunfish	-	X	-
Longear sunfish	X	-	-
Smallmouth bass	X	X	X
Spotted bass	X	X	X
Largemouth bass	X	X	X
Black crappie	-	X	X
Sauger	-	X	X
Walleye	X	X	X
Logperch	-	X	X
Tangerine darter	-	-	X
Freshwater drum	X	X	X

3.5.3 Wetlands

As defined in EO 11990 (Protection of Wetlands), wetlands are those areas inundated by surface water or ground water with a frequency sufficient to support, and under normal circumstances, do or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas, such as sloughs, potholes, wet meadows, mud flats, and natural ponds (TVA, 1983). USACE's wetland definition is very similar to TVA's and can be found at 33 CFR 328.3(b).

TVA's reservoir wetlands tend to be diverse and highly productive components of the overall reservoir ecosystem. Along reservoir shorelines, wetlands and riparian areas act as transitional ecosystems between terrestrial and aquatic communities. These areas provide habitat for many wildlife species, serve as shoreline stabilization zones, aid in flood control, and contribute to improved water quality. Most wetlands on Norris Reservoir are found in shallow coves or embayment areas. They generally are in linear strips following the shape of the shoreline and below the 1020-foot msl contour elevation (full summer pool).

The wetlands on Norris Reservoir primarily lie along approximately 133.5 miles of shoreline and consist of fringe and reservoir-influenced wetlands at or below the 1020-foot msl contour elevation. These wetlands largely consist of fringe and reservoir-influenced areas at or below the 1020-foot msl contour elevation. They are often disjunctive strips and patches ranging in size from 0.1 acre to 60 acres. These fringe and reservoir wetlands influence 16.5 percent of Norris Reservoir's 809 miles of shoreline and embody a variety of wetland habitat types, including aquatic beds and emergent, scrub/shrub, and forested wetlands, all of which can be found as isolated or mixed units. The small percentage of wetland acreage, when compared to all TVA land on Norris Reservoir, does not diminish the wetlands' overall importance. In fact, it serves to increase and focus their importance within the system, as it tends to concentrate the wildlife species utilizing these habitat types.

There are a total of four small emergent and scrub/shrub wetlands on the entire 1000-acre Sunset Bay area. Two of these wetlands exist below the 1020-foot msl contour elevation, and two are located above this elevation. They range in size from less than 0.1 acre to 0.25 acre. While all these small wetland areas are not significant in size, they are important elements in the overall ecosystem along the project shoreline. Common wildlife species likely to use these wetlands include wood ducks, mallards, Canada geese, great blue herons, green backed herons, king fishers, beavers, muskrats, common water snakes, and various turtle species.

Only one wetland, at the planned east entrance road stream crossing, is located on the TVA flowage easement and fee land. This is a 0.25-acre emergent wetland complex located within two stream channels, a farm pond outfall channel, and along the reservoir shoreline (Figure 14). The hydrology of this wetland complex is driven by stream flow, runoff and the water levels of Norris Reservoir. Dominant plants are *Lemna* sp., *Juncus* sp., *Carax* sp., and *Eleocharis* sp. Hydric soils are present in areas sampled.

TN Emmons has moved the east entrance road to minimize its effect on TVA flowage below elevation 1044-foot msl and TVA fee land below elevation 1020-foot msl. In the vicinity of the east entrance road, the developer would remove the old road fill between the former (i.e., 1934 survey of Rutherford property) and existing elevation 1020-foot msl as illustrated in Figure 15 (See Section 4.5.3 Effects on Wetlands in Chapter 4). Approximately 141 cubic yards of old fill material lies within this area. In accommodating the planned roadway fill, its removal would balance the net amount of new fill below elevation 1044 msl and possibly restore a small amount of power storage volume below elevation 1020 msl.

3.6 Air Quality

The state of Tennessee and the United States Environmental Protection Agency (USEPA) currently regulate annual and 24-hour concentrations of particulate matter less than 10 microns in diameter (PM10) through their enforcement of National Ambient Air Quality Standards. Air quality monitoring data are available at two locations in Union County. The nearest monitoring station is in the Luttrell area. In the vicinity of the proposed development, micro-meteorological conditions are influenced by local topography which can alter the dispersal of air emissions. In Union County, these topographic features include Clinch and Lone Mountains, adjoining valleys, and Clinch River and Norris Reservoir.

Union County is currently in attainment for all air quality standards in accordance with the Rules of TDEC, Bureau of Environment/Division of Air Pollution Control Chapter 1200-3-3 Ambient Air Quality Standards (Stephens, 2002; see Chapter 9).

3.7 Water Quality

3.7.1 Norris Reservoir Water Quality

Norris Reservoir is formed by Norris Dam at CRM 79.8. The reservoir is a large tributary storage impoundment of the Clinch and Powell Rivers that flow together about 9 miles upstream of the dam. Norris is one of the deeper of the TVA tributary reservoirs, with depths over 200 feet. Annual drawdown averages about 32 feet. At full pool, the surface area of the reservoir is 34,200 acres; the shoreline is about 800 miles in length; and water is impounded 73 miles upstream on the Clinch River and 53 miles upstream on the Powell River. Norris Reservoir has a long average retention time (about 245 days) and an average annual discharge of approximately 4200 cubic feet per second. Due to the great depth and long retention time, significant vertical stratification occurs in the summer and fall months. This condition results in dissolved oxygen depletion in the lower depths of the reservoir during this period of the year.

The ecological health of the reservoir was rated “fair” by TVA in 2001. Much of the shoreline of Norris Reservoir is surrounded by low-intensity agricultural, residential, or forested land, resulting in relatively low pollutant loadings and generally good water quality. As of 2001, there were no state-issued fish consumption advisories, and none of the monitored recreation areas had bacteria contamination levels above the state of Tennessee water quality criteria for swimming.

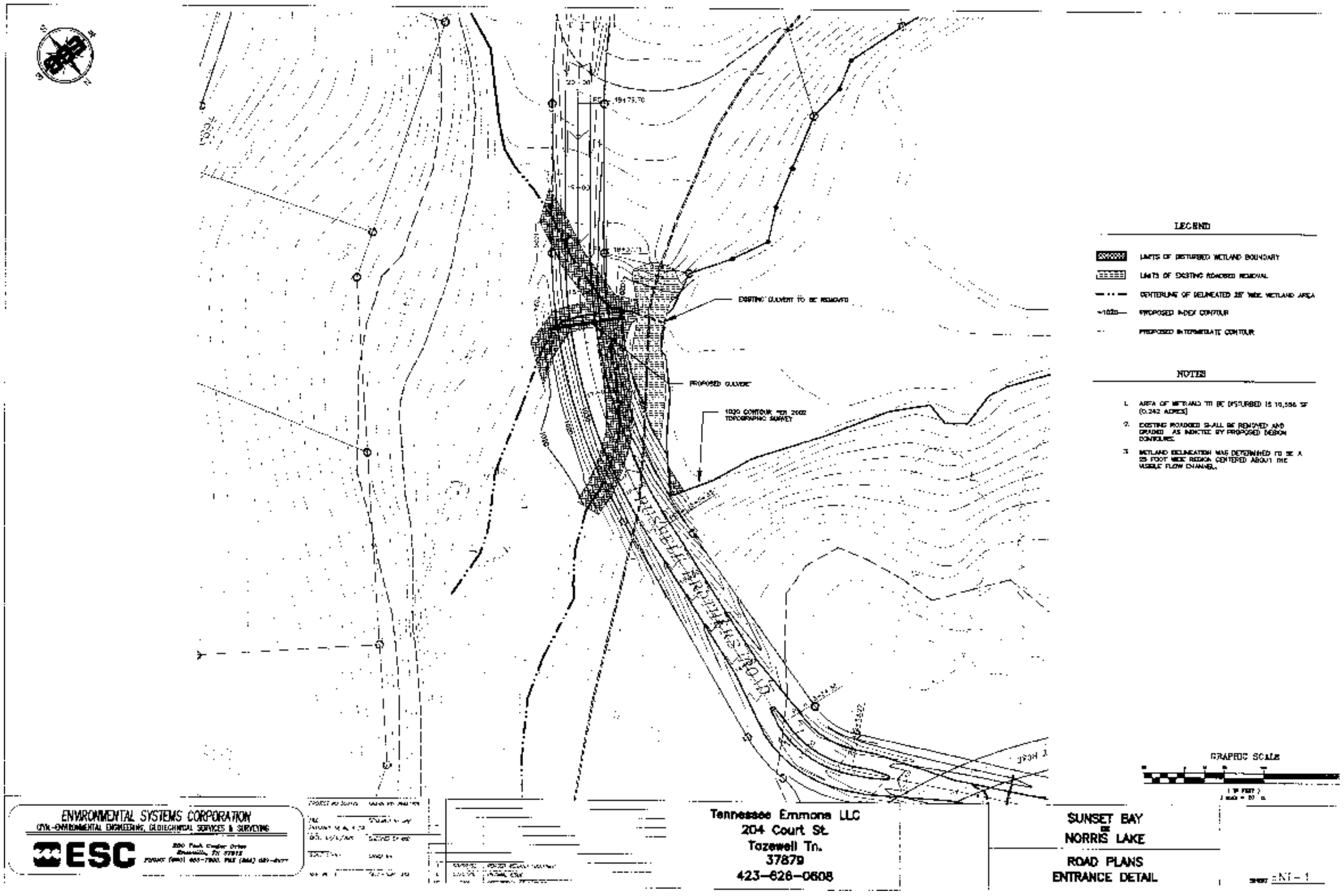

Figure 14. Sunset Bay Road Plans Entrance Detail - Boundaries of Disturbed Wetland Areas

Most of the site of the planned development, including the 14-acre deed modification areas, is pasture with scattered trees. The steepest part of the site, approximately one-third of the total area, is wooded. Trees line some portions of the shoreline, and small groups of trees are on the low-lying peninsulas. Because of cattle traffic and the lack of the deep roots provided by trees, much of the shoreline is currently subject to erosion from wave action and changes in water surface elevation.

3.7.2 Ground Water

This Valley and Ridge physiographic province is characterized by a sequence of folded and faulted northeast-trending Paleozoic sedimentary rocks that form a series of alternating valleys and ridges. This physiographic province, in the eastern part of Tennessee, is underlain by rocks that are primarily Cambrian and Ordovician in age. Karst feature developments in the Chickamauga Group limestone are prevalent throughout east Tennessee. Soluble carbonate rocks and some easily eroded shale(s) underlie the valleys in the province, and more erosion-resistant siltstone, sandstone, and some cherty dolomite underlie ridges. The principal aquifers in the Valley and Ridge province consist of carbonate rocks that are Cambrian, Ordovician, and Mississippian in age (Lloyd and Lyke, 1995).

The chemical quality of water in the Valley and Ridge aquifers is similar for shallow wells and springs. The water is hard, is a calcium-magnesium-bicarbonate type, and typically has a dissolved-solids concentration of 170 milligrams per liter or less (Lloyd and Lyke, 1995).

In places where the residuum that overlies the carbonate rocks is thin, the Valley and Ridge aquifers are susceptible to contamination by human activities. The complex network of fractures, bedding planes, and solution openings developed in the carbonate rock allows rapid local groundwater movement. The natural groundwater quality is subject to degradation in places where landfills and other waste disposal sites, underground storage tanks, and septic tank systems are located.

At this site, localized areas exhibit karst development characterized by depressions (i.e., sinkholes), with internal drainage. Engineering applications would be designed incorporating accepted industry practices and standards to ensure safe, compatible development over and around such natural features. The communal parking lot, 1 of the 3 areas subject to the deed modification, is proposed to be constructed on fill on one such feature.

3.8.1 Wastewater Treatment

Municipal sewer service is unavailable on or near the property. The distance to the nearest municipal wastewater collection and treatment system (in Maynardville) prohibits economical service for Sunset Bay via connection to an existing system. The sewage system would consist of individual treatment units located on each lot, a treated sewage effluent collection system, and disposal of treated sewage effluent via slow-rate land application. When constructed, the sewer facility would ultimately be owned and operated by HPUD.

Union County oversees the management of solid waste generated within the county. The county provides convenience center collection stations for drop-off of residential waste. This system is serviced by Waste Management, Inc. (WMI) One convenience center

station is located at Sharps Chapel on Brantley Road. Some residential waste is collected by a private hauling contractor (Nelson, Inc.) operating within or near the Sunset Bay area. Residential waste collected from within the county is transported to the Chestnut Ridge Landfill for long-term storage. The Chestnut Ridge facility is located in Anderson County and is owned and operated by WMI.

3.8.2 Services

The nearest fire protection service provider is the local volunteer fire department in Sharps Chapel. Police protection services are provided by the Union County Sheriff's Department. Union County currently contracts with Quality Care Ambulance Service (QCAS) for provision of emergency medical service in the county. The nearest acute care facility is the Claiborne County Hospital in Tazewell, approximately 20-25 minutes from Sharp Chapel (source: QCAS).

The Powell Valley Utility District provides electricity to the Sunset Bay area.

The proposed Sunset Bay property is located within the Union County School District. The subdivision area would be served by the Sharps Chapel Elementary School and by the Horace Maynard Middle and Union County High Schools (both located in Maynardville). The current enrollment of the Union County School system is 3061 students. The system's facilities are currently overcrowded, and there are no specific plans for system expansion.

3.9 Cultural Resources

For at least 12,000 years, the land along the Clinch and Powell Rivers has been an area for human occupation that became more intense through succeeding cultural periods. In the east Tennessee area, archaeological investigations have demonstrated that Tennessee and the eastern Ridge and Valley region were the setting for each one of these cultural/temporal traditions, from the Paleo-Indian (10,000-8000 B.C.), the Archaic (8000-1200 B.C.), the Woodland (1200 B.C.-1000 A.D.), the Mississippian (1000-1500 A.D.), to the Protohistoric-Contact (1500-1750 A.D.) periods. Prehistoric archaeological stages are based on changing settlement and land use patterns and artifact styles. Each of these broad periods is generally broken into subperiods (Early, Middle, and Late), which are also based on artifact styles and settlement patterns. Smaller time periods, known as "Phases" are represented by distinctive sets of artifactual remains. In addition, historic era cultural traditions have included the Cherokee (1700 A.D.-present), European- and African-American (1750 A.D.-present) occupations.

The Paleo-Indian period (10,000-8000 B.C.) represents the documented first human occupation of the area. The settlement and land use pattern of this period were dominated by highly mobile bands of hunters and gatherers. The subsequent Archaic period (8000-1200 B.C.) represents a continuation of the hunter-gatherer lifestyle. Through time, there are increasing social complexity and the appearance of horticulture late in the period. The settlement pattern during this period is characterized by spring and summer campsites. Increased social complexity, reliance on horticulture and agriculture, and the introduction of ceramic technology characterize the Woodland period (1200 B.C.-1000 A.D.). The increased importance of horticulture is associated with a less mobile lifestyle as suggested by semi-permanent structures.

The Mississippian period (1000-1500 A.D.), the last prehistoric period in east Tennessee, is associated with the pinnacle of social complexity in the Southeastern United States. This period is characterized by permanent settlements, maize agriculture, and chiefdom-level societies. The Protohistoric-Contact period (1500-1750 A.D.) consisted of the effects of European contact in the region. During this period, European contact arose through trade and construction of European settlements along the borders of Native American territory. European-American settlement increased in the early nineteenth century as the Cherokee were forced to give up their land. Union County was established in 1856 (Peters, 1998). The county was characterized by a rural agrarian economy and later industry.

Pursuant to the National Historic Preservation Act (NHPA) of 1966 and the Archaeological Resources Protection Act of 1979, TVA preserves significant archaeological resources, historic properties, and historic structures located on TVA land or affected by its undertakings. A historic property is defined, under 36 CFR § 800.16 (l), as "any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places" [16 U.S.C. 470w (5)].

As indicated in Chapter 1, TVA has determined that the residential development is not directly dependent upon construction of the east entrance road, the deed modifications, or the community dock facilities. As a result of these considerations, approximately 65 acres of land within the proposed development was considered to be within the Area of Potential Effect (APE) and, therefore, included in the Phase I survey to identify the presence of archaeological resources. These areas include:

- Fill below elevation 1044-foot msl for riprap and culvert for the east entrance road.

- Deed modifications (fill and/or structures) below elevation 1044-foot msl affecting three areas, which include the two peninsulas on which 30 lots/homes are proposed to be built, and the common lot on which a clubhouse/deck and parking facility is proposed to support use of nearby community dock and other recreation facilities.

- A community dock and harbor limits to elevation 985-foot msl, dock access walkway (i.e., catwalk), clubhouse/deck, and boat launching ramp (including all areas of placement of fill for construction and riprap for stabilization).

- An off-site borrow area from which fill material would be obtained to raise land elevations to 1044-foot msl (or above) or to use for other project construction.

Phase I surveys were conducted by BHE over 65 acres of the Sunset Bay project area in April and May 2002. In addition to the areas mentioned above, the surveyed areas also included other locations on the private land above and below elevation 1044-foot msl. These areas include land adjoining the proposed peninsula fills where vehicle or equipment traffic would likely cause indirect effects, shoreline adjoining and south of the community dock location, and TVA land down to the high water level of Norris Reservoir (below elevation 1020-foot msl to approximate elevation 1015.6-foot msl [water level elevation on April 19]).

These surveys identified eight archaeological sites (Grooms, 2002). These sites ranged in age from both prehistoric to historic periods. Based on the lack of intact cultural deposits and no potential to yield additional information important in history or prehistory, all of these sites were recommended as ineligible for listing in the NRHP.

Union County, Tennessee, currently has three historic properties listed in the NRHP. None of these properties are located in the project area. Existing data along with the recent survey results were reviewed, and from these data, no archaeological sites or historic structures or sites recommended as either eligible or potentially eligible for listing on the NRHP are located on the affected property.

3.10 Floodplains

The area affected by Sunset Bay extends from the mouth of Lost Creek to mile 6.0. TN Emmons' requested approvals of an entrance road, community dock, boat ramp, and deed modification on land in 3 areas on TVA flowage easement land could potentially affect land within the 100- and 500-year floodplains. Fill material is proposed to affect a minor amount of flowage easement land below elevation 1044-foot msl and, to a lesser extent, below elevation 1020-foot msl for the east entrance road and in the vicinity of the community dock. Flowage easement land for home sites within 2 of the 3 deed modification areas (peninsulas) would be filled to elevation 1036-foot msl or 1 foot above the 500-year flood elevation.

The area affected by Sunset Bay extends from the mouth of Lost Creek to mile 6.0. The 100-year floodplain for this area is the land located below contour elevation 1032-foot msl. The 500-year, or "critical action floodplain," is the area lying below contour elevation of 1035-foot msl. Union County, Tennessee, does not participate in the National Flood Insurance Program.

3.11 Prime Farmland

The major agricultural land use in the county is for raising cattle and growing small grains. Statistics from the Agriculture Census for Union County for the years 1987, 1992, and 1997 show that about 66 percent of the farms sell cattle and about 90 percent of the harvested cropland is hay, alfalfa, and other small grains. Most of the shoreline acreage of the Sunset Bay site, including the approximate 160 acres of TVA flowage easement land, is cattle pasture with scattered trees. The borrow area has recently been disturbed by TDOT for use in roadway improvement projects.

Prime farmland soils, as defined by the USDA, are those soils that have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops. They have properties needed for the economic production of sustained high yields of crops. Prime farmland soils may presently be in use as cropland, pastureland, range land, forestland, or other uses, but cannot be urban or built-up land. The conversion of farmland and prime farmland to industrial and other nonagricultural uses essentially precludes farming the land in the foreseeable future. Creation of the Federal Farmland Protection Policy Act of 1981 set forth guidance which provides that federal agencies evaluate land prior to permanently converting it to a nonagriculture land use. Form AD 1006, *Farmland Conversion Impact Rating*, is generally completed by federal agencies with assistance from the Natural Resource Conservation Service to determine whether a site is farmland subject to the Farmland Protection Act (see letter from Natural Resources Conservation Service in Chapter 9).

About 14 acres of alluvial soils on the Sunset Bay site have the chemical and physical properties to be classified as prime farmland (see Table 4). But, these soils are located in areas that are subject to flooding and under these conditions are not considered prime farmland. None of these soils have the properties to be classified as prime farmland (Conner, 2002). The proposed site for the borrow area (i.e., soil material for fill construction) is located in a section containing Dewey silty clay loam on 8 to 10 percent slopes. This soil is of the eroded, rolling phase and not classified as prime farmland.

Table 4. Soils Classification and Acreage on Sunset Bay Residential Development and Proposed Borrow Area Sites*

Sunset Bay Development Site				
Soil	**Phase**	**% Slope**	**Soil ID**	**Acres**
Alluvial soils, undifferentiated **		0 to 3	A	14
Caylor silt loam	rolling	7 to 15	Cro	89
Hector stony fine sandy loam	steep	30 to 60	Hfz	36
Lehew fine sandy loam	steep	30 to 60	Lhz	200
Rolling stony land, Talbott material		7 to 30	RIT	257
Rough gullied land, Talbott material		7 to 30	RgT	2
Smooth stony land, Talbott material		0 to 7	SsT	3
Talbot silt loam	undulating	2 to 7	Tsn	16
Talbott silty clay loam	eroded rolling	7 to 15	Tce	20
Talbott silty clay loam	eroded hilly	15 to 30	Tct	89
Talbott silty clay loam	eroded steep	30 to 60	Tcf	196
Borrow Site				
Dewey silty clay loam	eroded rolling	8 to 10	Dwe	

*Soil Survey of Norris Area, Tennessee, USDA-Soil Conservation Service with Tennessee Agriculture Experiment Station and TVA, 1953
**Classified as prime farmland unless frequently flooded

3.12 Visual Setting

The visual setting includes gently sloping, heavily wooded shoreline of the Chuck Swan WMA area across the embayment and several wooded islands along the Sunset Bay waterfront. This setting also includes the adjacent main reservoir channel (Clinch River), as well as other islands, open water, and steep, wooded state park land, all to the southwest.

The privately owned project area extends from shoreline to ridge top along the south side of Lost Creek embayment. The linear landform is divided into several peninsulas, which are separated by five main coves and several smaller ones. The current visual character is a pastoral mix of open grass and scattered trees with a woodland background. Pasture areas slope moderately to the water from the toe of steep, wooded hills about 600 feet high. Narrow strips of trees varying in length up to 300 feet occur along the embayment in several areas, and they visually screen portions of back-lying pastures. Nearby wooded islands also screen some views. Rock outcrops at the shoreline provide scenic interest and are located primarily along the peninsula tips. A field road, two barns, and some fencing are the only developed features, and they are partially hidden in most views. Together, these elements provide scenic variety and form a tranquil, generally harmonious,

rural, reservoir landscape. The aesthetic sense of place is a visually attractive shoreline area that also serves as a scenic backdrop. Visual integrity is moderate, and present scenic value is good. Active plans for a residential development project are expected to notably alter the appearance of this landscape in the near future.

The sizable subdivision would replace most pastures and portions of the hillside woodlands. The clearing, roads, and large homes would create substantial adverse contrast. Trees could be removed down to normal summer pool elevation which would increase public visibility of the development. Anticipated private water-use facilities would add discordant contrast along the shoreline, and related watercraft would add visual congestion on the waters nearby.

The project area is seen in foreground views from boats in the embayment and the adjacent main channel, as well as by pedestrians in the WMA and on private farmland to the northeast. The parcel is also visible from some areas of Big Ridge State Park and up to 2 miles away over open waters to the southwest.

A former department of transportation borrow area would be used to obtain material for the Sunset Bay fill areas. It is located off-site along Big Valley Road, about 4 miles away. The visual character is a gently sloping open grass area surrounded on three sides by a strip of wooded TVA shoreline. The strip varies from 100-400 feet wide, and the mixed woodland screens most views from the water. Passing motorists on the road see the parcel in the immediate foreground, and there may also be incidental views from the nearby school. Visual integrity of the reclaimed area is moderate and current scenic value is fair.

3.13 Noise

The ambient noise levels were measured at the proposed community dock location and at Chuck Swan WMA, close to the shore on a Wednesday. Measurements were taken every minute for 80 minutes between 12:06 p.m. and 1:25 p.m. Based on the data, the background level at the community dock location is estimated at 48 dBA (decibels) (level exceeded 90% of the time) while the background level at the Chuck Swan WMA area is estimated at 52 dBA. The difference in these levels is probably due to the trees in the Big Ridge State Forest area, generating noise while moving under the effect of the wind (the community dock location was surrounded by pasture and grassland).

The ambient noise levels were measured at Big Ridge State Park, close to the shore on Saturday, June 15, 2002. The unit was programmed to take data every other minute for 6 hours, 10:00 a.m to 4:00 p.m, because most boat traffic is expected in this time interval. There was no boat count available to determine how the data compared to the assumed number of outings.

Noise was also measured inside the boat which was as high as 105 dBA. Data from *Boatingmag.com* indicate peak levels varying from 85 to105 dBA for a variety of crafts at their highest speed. So, the boat used was one the noisiest possible. The noise measured from the shore was approximately 58 dBA which means that the loudest boats would be clearly noticeable above background levels while they are operating, while the low speed boats would be just noticeable. In general, people sense an increase of 3 dBA as just noticeable, an increase of 5 dBA as “clearly noticeable,” and an increase of 10 dBA as a doubling of sound level.

Community noise impacts are generally evaluated using L_{dn} which is the A-weighted day-night equivalent sound level with a 10 dBA penalty added to all values between 10 p.m. and 7 a.m., to account for the extra sensitivity to noise that most people have at night. There are no federal or state regulatory requirements for acceptable noise levels, but EPA guidelines recommend L_{dn} of 55 dBA or less for protection of public health and welfare with adequate margin of safety. The Federal Interagency Committee on Noise (FICON) considers noise exposure levels lower than 65 dBA to be compatible with most residential land uses. Forestry, fishing, and recreational uses such as outdoor sports and water recreation are compatible with sound levels up to 70 dBA without special accommodation.

The daily L_{dn} at Big Ridge Sate Park is estimated to be 63.5 dBA, using the data measured between 10:00 a.m. and 4:00 p.m. on a Saturday, assuming a background noise of 52 dBA the rest of the day (value from Chuck Swan WMA), and an expected nighttime ambient noise level of 40 dBA (typical for a rural area). The current annual L_{dn} would be estimated to be 57.2 dBA. This assumes existing boat traffic of approximately 37,454 boats per year, each passing twice for five minutes and that the background noise is 52 dB during the day without boats and is 40 dB at night. This current level is higher than EPA guideline for residential areas, but within FICON guidelines for residential and recreational areas.

The annual Ldn near the shore at Chuck Swan WMA is expected to be similar to the value calculated for the shoreline at Big Ridge State Park. Since both sites are forested, the noise level 100 feet from the shore would be 6 to 10 dBA less than the noise level at the shoreline due to the sound absorption of the trees (Egan 1988).